



Dendrobates tinctorius
(2 White morph variants)

AMERICAN DENDROBATID GROUP

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STATEMENT OF PURPOSE

The purpose of the American Dendrobatid Group (ADG) is to educate enthusiasts and distribute information on all aspects of Dendrobatid husbandry and captive propagation. To develop better communication between Dendrobatid breeders and other frog breeders. The ADG is also interested in the maintenance and propagation of Mantellid frogs, Atelopid toads, and other unusual frogs and toads. This Newsletter appears four times a year at a cost of \$15.00 per calendar year. Back issues are \$3.00 each, or on a yearly basis: 1992 is available for \$5.00; 1993 and 1994 for \$10.00/year, and 1995 for \$12.50, and 1996 for \$15.00.

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Notes from the Editor

I have heard a few people suggesting making the American Dendrobatid Group a public, non-profit organization. What this means is installing a president, vice-president, etc., and coming up with a constitution. One potential reason for this is to have more people involved and, hopefully, install a feeling of ownership into the people involved. At present it is run as a for-profit business by myself.

As stated above, currently the ADG is run as a for-profit business. Unfortunately after 5 years it has yet to make a profit on its own and I have supplemented it with my own income from the sale of some of my frogs. Current membership is 183 people, but perhaps 10 of these are sent on an exchange basis for other publications. Membership usually tops out at about 250 by the end of the year, but is under 100 when the first issue of the year is printed. I am more than willing to make the ADG a public organization, but there might be some potential problems. Mainly it can't cost me anything extra and people have to be interested and willing to do the work of running the organization. I'm unwilling to pay anything extra to set up a public organization at this point. So we'd have to find a layer who is willing to work gratis to set up the organization. We (the royal we) would have to find or elect people willing to fill the offices and DO THE WORK involved with running the ADG. Also if it becomes public I would ask for a nominal salary for putting out the Newsletter, but this would be worked out by the people elected to run the organization.

I'm throwing this out to get everyone's input on what they'd like to see done and what direction they'd like to see the ADG go. This has already been presented on FrogNet and there the feeling is to leave the ADG alone and let it run as it has, which is fine with me. But I want the general memberships input, also. Please send in your opinions on the subject and if anything is changed I'll let you know.

Along another line I'd like to thank Kay Klausing for translating the article by Dirk Jorgens which appears on the next page. Thanks Kay.

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IMPRESSIONS FROM THE BIOTOPE OF *PHYLLOBATES TERRIBILIS*

Dirk Jorgens

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Poison frogs (family Dendrobatidae) are among the most popular terrarium inhabitants. The most toxic of these is *Phyllobates terribilis*, the "terrible poison frog", which is endemic to the Pacific coastal lowlands of Colombia (Choco).

The Quebrada Guanguí area is located amidst tropical lowland rainforest. It takes about 7 to 14 hours of travel, depending on the weather and season, in a dug-out canoe from a small village on the Pacific coast of Colombia to get there. The landscape is dominated by densely forested hills, up to 200 m elevation, with little streams called Quebradas (Spanish for "mountainous canyon"). The banks of the larger river are often inhabited, albeit sparsely, and are clear-cut for agricultural purposes, such as sugar cane and banana. My first excursion into this area in May 1994 almost failed when our boat nearly capsized in the torrential rain storms. However, I was obsessed with the idea of observing and photographing *Phyllobates terribilis* in its natural habitat and, therefore, I pressed onward. By late night, with the support of several Embera Indians and their chief, Enrique, we made our way by dugout canoe to the habitat of *Phyllobates terribilis*. At 6 AM the next morning, in a torrential rain, I was given one hour to hunt for the most poisonous species of frog. So, I crossed the river and hiked inland through walls of rain and undergrowth, following a stream to avoid having to use our machetes. We were only moderately successful, and had to literally cut our way to the top of the hill, where we began our search.

In front of me sat the most poisonous of all poison frogs

May, 1994: All of a sudden there he was sitting right there in front of me, *Phyllobates terribilis*. In my opinion, he was more splendid than all the pictures I had ever seen. The shiny metallic green was a truly impressive sight! Not only was I fascinated by the frog, but the entire atmosphere captivated me. The ground was densely covered with gigantic leaves and fallen tree trunks overgrown with bromeliads and wet moss - the pristine state of this rainforest was more beautiful than could be imagined. This animal shouldn't be the last one I would see and so I decided to return at a better time with a better boat to learn more about this magnificent poison frog and its biotype. With this idea fixed in my mind, the 14 hour return trip in constant rainfall was more tolerable.

February 1995: I am in a boat again, this time a big dug-out canoe, which mastered the many rapids effortlessly. By chance I met an Indian friend from the previous year and together we move upstream under the scorching sun. Although we had to get out several times to lift the boat over shallow water, we only needed 7 hours to travel to La Brea, where we planned to spend a few days. Myers, Daly & Malkin (1978) described this as the type area for *P. terribilis* and we collected many animals here. However, we did not find any *P. terribilis* in the vicinity of this village, only *Minyobates minutus* (the village appears to be the southernmost known locality for this species).

The frogs are killed because of fear of their strong poison

From the locals we learned that all *P. terribilis* are immediately killed because of their extreme toxicity, this is done to protect children and pets. Young inexperienced dogs have been observed picking up a frog in their mouth and dying immediately.

We traverse the river by foot and on the other river bank, we climbed an almost vertical hill, typical for this region. The back of the hill is a little less steep, but then we ascend again up a stream, up another hill. On this side, facing the stream, I spend the next 3 days - approximately 8 hours each day- looking for frogs, but came up with only 3 *P. terribilis*, 1 *D. histrionicus* (this animal had a different coloration as the specimen from Quebrada Guanguí) and several *Minyobates minutus* as well as *Epipedobates boulengeri*. After the 3 days we were picked up and drove to Quebrada Guanguí, the village of the Embera-Indians, situated at the mouth of the river. Chief Enrique welcomed us wholeheartedly remembering me from last year, and invites us to his home, where soon the entire village has gathered. The following days we keep busy exploring the entire surroundings for *P. terribilis*. During the eight days, we were only able to find 16 specimen, all of them at the top of the hills; with the average daytime temperature is near 29°C. Luckily, we were able to photograph two tadpole-carrying males, which surprised us, since now, it was the dry season and we weren't able to locate any water suitable for depositing tadpoles.

The males vocalize rarely

During our exploration we had the pleasure to hear *P. terribilis* calling only a few times. Most often, the calling male was sitting amidst a thicket on the other side of an untraversable Quebrada River. But the frogs became more populous away from the village and therefore the further we got from human dwellings the more we heard them.

In contrast to *P. terribilis*, *Dendrobates histrionicus* can be found relatively often. Most of the animals are red and yellow on a black background - with very contrasting coloration which clearly distinguishes the animals from around Guanguí from other populations. The forest was full of their calls and they were frequently seen sitting together as pairs. But, since we had come mainly interested in *P. terribilis*, we soon stopped listening to the constantly calling of the *D. histrionicus* and no longer paid them much attention. Although at one point we were very glad we did pay attention, because the call was not quite right and was not from *D. histrionicus*, as a *D. occultator* suddenly appeared in front of us. Since its call was nearly identical to *D. histrionicus*, we almost missed it. In contrast to what was published by Myers & Daly (1976), all the animals we observed were close to the ground. Luckily, we were able to find many individuals in a short time span, which we identified by their call. I assume we only saw males.

We found *D. occultator* only in the tributaries of the Quebrada Guanguí. We were not able to locate a single individual around La Brea. These frogs sport numerous yellow spots on their black flanks and the back is reddish. After a heavy downpour, we found by chance a very large and noticeably pretty colored Hylidae, *Hyla pictorata*. *Minyobates viridis* is supposed to occur in this region as well, but I only found them at their type locality on the upper Rio Anchicaya, which is 120 km away and at an elevation 1,000 meters higher.

Close to the coast all frogs are greenish-blue

On our third excursion to Columbia in April 1996, we planned to study the distribution of *P. aurotaenia*, *P. bicolor* and *P. terribilis* in greater detail. Following a hint from a friend, we searched at the same river, the Quebrada Guanguí. This time relatively close to the coast, about 4 hours travel by dug-out canoe from the type locality. The biotype was identical to the one previously described, but here we found greenish-blue, very light colored *P. terribilis*. Myers, Daly & Malkin (1978) describe specimen from La Brea as having a light metallic green color. Since I do not have color photographs to compare, I am not able to judge if our animals are the same color variety they

described. Again, we were able to find *M. minutus*, which we observed carrying tadpoles. At the beginning of the rainy season we located many *P. terribilis* males by their loud call. One male was even observed carrying 8 tadpoles on its back. Only once did we see a pair, and again, we could only find a single juvenile - about 2 cm in length.

Three color forms of *P. terribilis* can be distinguished

The populations of *P. terribilis* we found can be divided into 3 color variations: 1) The orange-colored animals from La Brea and most of the Quebrada Guanguí area. 2) A bright light-yellow form, which we found a few kilometers away from La Brea and also in the vicinity of the Quebrada Guanguí. These yellow animals most often showed shades of light green or turquoise on their hind legs. The thighs of the hind legs were commonly more or less granulated. 3) The third color variety possessed a metallic green-blue coloration [no locality information was given for this color morph, Ed.]. All these varieties have a black snout stripe.

Based on statements made by the Ember-Indians and other inhabitants of this region, as well as the discovery of the new locality of the green-blue color morph, it can be assumed that *P. terribilis* has a much wider distribution than previously documented.

Due to the current unsafe political situation in Colombia, we were not able to continue this year's excursion to the Quebrada Guanguí. The natives knowledge of the use of these frogs and the blow guns is being lost to "progress." In the village of the Embera only a single indian still knows how to manufacture a 'borocera', a 'ninhepete' and 'uckides' (the words mean 'blow gun', 'quiver' and 'arrows'). He is the same fellow who manufactured these things for Myers, Daly and Malkinin.

Acknowledgment

I'd like to thank Martin Schiller, Berlin, for accompanying me on my 2nd and 3rd trip, Stefan Lotters, Bonn, for helpful information and the Embera, whose hospitality and helpfulness I enjoyed.

BEGINNER'S COLUMN

Vivarium design options for Dendrobatid frogs - Ideas gleaned from FrogNet - Vivarium substrates

Ken Uy <kenuy@earthlink.net>

There are many choices of materials one can use for poison frog vivarium substrates. It depends mostly on the primary function of the vivarium, but there are several general requirements for the substrate. The most important characteristic of a substrate is that it should be able to withstand constant moisture. Since most Dendrobatid frogs are tiny and can desiccate quickly their tanks must be kept moist and sprayed often, especially when breeding is desired. Substrates that break down quickly or produce molds are undesirable in this type of environment as they may develop by-products that could harm the frogs. Molds and fungi that develop on some organic substrates may not directly harm adult frogs, but may affect the viability of their eggs and could potentially be harmful to young frogs.

For obvious reasons, the substrate must also not be toxic to the frogs. Materials like redwood chips or cedar shavings are undesirable because they contain resins that easily penetrate the moist, sensitive skins of the frogs. Some paper substrates may release toxins if they contain colored inks.

The texture of the substrate must also be considered. Sharp gravel chips may cause abrasions that lead to infections, and fine sand may cause gut impaction if they are ingested along with food insects.

When one first acquires a frog, it is recommended that it be kept in a small quarantine tank

BIOLOGICAL FILTRATION

For most of us, a dart frog vivarium isn't complete without a small body of water for that "natural" look. A small dish, easily removed for cleaning, is one solution. But what about a larger body of water, such as a sectioned-off part of the vivarium floor? It can be a quite a chore to clean out such a pond every time a frog defecates in it or a cricket is discovered drowned and rotting in the water. This is where biological filtration can be put to good use to help maintain water quality.

When we think of water filtration, the first thing that comes to mind is the removal of particulate matter that would affect clarity. Unfortunately, even when water looks crystal-clear, it can still be harmful to the frogs. When waste products break down in water, chemical contaminants are produced. Biological filtration deals with these contaminants by the use of bacteria which chemically convert these substances into less harmful compounds.

These bacteria are aerobic in nature, meaning they require oxygen and lots of it to break down the pollutants. They also require a substrate to attach themselves to. Both these needs are easily met by allowing the water to be filtered by flowing through any inert substrate. When that happens, nitrosomonas bacteria that colonize the substrate consume the primary contaminant, ammonia, producing slightly less toxic nitrites. The nitrites are further consumed by nitrobacter bacteria and oxidised into even less toxic nitrates. The bacteria's progress can be monitored using aquarium test kits that measure ammonia, nitrite and nitrates. When the point is reached where no ammonia or nitrites can be detected even as waste products are being added to the water, the biological filter can be considered mature and it can handle the vivarium's waste products as long as there is no sudden large increase in ammonia produced. Nitrate will eventually accumulate, but it can easily be removed by periodic water changes - at much less frequent intervals than if ammonia was the main pollutant.

There are several ways to mature a biological filter, the simplest being to introduce a small initial population of animals to minimize the amount of ammonia produced, and allow naturally occurring bacterial spores from the air to colonise the filter substrate. As the bacterial population establishes itself, more animals can be introduced and the bacteria will adjust to the increasing waste load. To speed things up a bit, one may introduce the bacteria using commercially available cultures sold through aquarium supply sources. Alternatively, a very dilute solution of household ammonia or ammonium sulfate may be added to the water BEFORE any animals are introduced. When no more ammonia and nitrite can be detected and nitrate is being produced, then the filter is ready to handle a colony of frogs. If using this method, take no chances and use a good test kit.

for observation before other frogs in the collection are exposed to it. The best quarantine tank substrates are those that, besides meeting the above criteria, allow easy observation of the frog and allow easy cleaning of the tank. Plain white kitchen paper towels are a very good substrate - it is readily available, easily replaced, can be kept moist, and makes it easy to check if the frog is eating and producing droppings. Frequently changing the quarantine substrate also helps reduce any parasite loads by removing parasite eggs and/or the parasites themselves which are excreted in the frogs urine and/or feces. Another possible choice is moistened sphagnum peat moss or sphagnum

moss (not the green moss which is sold in many garden centers). Because these substrates do not provide much cover for the frogs, it is best if some sort of hiding place is provided to allow the frogs to feel secure and reduce psychological stress.

If large numbers of vivariums are to be maintained and aesthetics is not a concern, paper towels are an economical choice if one needs to replace the substrates frequently. However, if the frogs are healthy, total replacement of the substrate may not be necessary. The main concern in this case would be the removal of waste products that may build up to toxic levels. There are two ways to deal with this if the substrate is not to be replaced: the substrate must be washable, or it must be able to support nitrifying bacteria that can break down ammonia and render it harmless to the frogs (see side bar). Some keepers use materials like air conditioner filters that are easily rinsed off, allowing debris and waste water to drain away or be siphoned off. An alternative would be stiff plastic mesh supported by plastic "eggcrate" light diffuser material. Such synthetic materials are often lightweight, and this may be a plus in some situations where many tanks are to be supported on a shelf. The material may be covered with sheet moss or dead leaves to be visually appealing and to provide hiding places for the frogs. Another choice would be pea gravel or expanded clay granules which are also easily hosed down and drained. They are also easy to contour in the tank, allowing some form of landscaping to be done. However, being loose materials, they are more difficult to remove from the tank if such a course of action is necessary. Gravel is also heavy, and one should make sure that tank shelving can support the weight. If frequent rinsing is to be conducted with these materials, the tanks have to allow the waste water to drain off or collected where it can be siphoned off.

If waste materials remain in the tank, they eventually break down and release ammonia which is toxic to the frogs. One low-maintenance way to deal with these waste products is to convert the substrate material into an active biological filter that can break down waste products. Biological filtration is accomplished by allowing certain bacteria to break down animal waste products under wet but aerobic conditions. All that is needed is that oxygenated water be able to flow through the substrate continuously. Frequent misting that causes water to passively trickle down through the substrate and drain away will keep the substrate moist enough to sustain the bacteria. Or water can be circulated in the tank using some sort of pump. This can be accomplished simply by burying a power head in the substrate, making sure that there is some sort of grill or screen to keep the substrate (and frogs) from being sucked into the pump. An alternative would be to allow the water to drain into a sump and pump it back into the tank as a waterfall or mist. If a sump is not possible, a small chamber fashioned from a perforated plastic box with a lid that is buried in the substrate can serve as one within the tank itself. The lid of the box should be above the substrate to allow easy access, and it can be covered with moss or a piece of bark to hide it. The point of keeping the power head isolated from the substrate is to facilitate its removal for cleaning and maintenance without having to dig it up, but it can be buried. The thing to watch out for in biological filtration are "dead areas" where there is no water flow. In re-circulating systems using in-tank pumps, it is best to divert the water as far away from the intake as possible so that the water is forced to flow through the substrate before being sucked in again. The flowing water carries oxygen to the bacteria that colonize the materials, and these aerobic bacteria ultimately convert ammonia from the frogs' wastes into less toxic nitrates. Mist systems that allow water to drain away probably allow the least amount of waste products to remain in the tank. In cases where the water is re-circulated in the tank, it is advisable to occasionally drain and replace the water to remove nitrates that will accumulate.

If plants are to be directly planted in the substrate, then the choice of substrate will have to make allowances for the plants needs as well as the frogs. Many common house plants will adapt to hydroponic growing conditions where their roots are constantly in wet gravel. All that is required is to take cuttings and stick them into the moist substrate and provide enough light. The substrate needs to be firm or heavy enough to support a possibly top-heavy plant. In combination with the flowing-water method outlined above, minimal maintenance is required for the vivarium because the plants absorb much of the frogs waste products.

Some brands of potting soil may be used in vivariums, but care must be taken in their choice. Mixes with fertilizers or incompletely composted manure should be avoided, as well as mixes that include fillers like Styrofoam beads or a high proportion of vermiculite, which might stick to moist amphibian skins. Potting mixes usually require some form of drainage to prevent souring of the medium and waterlogged plants. This may be accomplished using a layer of gravel, with or without an additional layer of activated charcoal, or the false bottom of plastic egg crate covered with landscape fabric or window screening under a soil mix. Undergravel filter plates work well also, and a capped riser tube may be used to siphon excess water. Tanks with misting systems generally require drainage holes to allow excess water to escape. When using soil mixes in conjunction with power heads or other water pumps, extra care must be taken that the finer particles are prevented from being sucked into the pump causing them to clog.

One soil mix posted by Ron Gagliardo on FrogNet provides excellent drainage and may be used for many epiphytic plants. This mix was developed at the Atlanta Botanical Gardens and consists of the following: 2 parts fine fir bark, 2 parts fine tree fern fiber, 2 parts milled sphagnum moss, 1 part fine charcoal, 1 part peat moss. A 1-2" layer of coarse charcoal underneath this mix provides extra drainage. It is open enough that it works for many epiphytic plants even when pools of standing water are on the surface of the mix.

Introducing soil organisms often has beneficial results. Small earthworms may be used to keep the soil turned over, and they consume frog droppings and food debris and help to break them down faster. Pillbugs and sowbugs are also excellent scavengers, as are springtails. All these small animals are good to have in the tank for the frogs to snack on, and help maintain the tank's mini-ecosystem.

The next part of this series will cover landscaping and plants for the dart frog vivarium.

VETERINARY NOTES

What do I do with my new frog(s)?

Brian Monk

I have been asked this question several times, most often by people who have lost new frogs once and don't want to lose any ever again. It is a good question, as the problems related to the shipping or receiving of frogs (wild-caught or captive-bred) which is probably the greatest cause of death in a newly acquired amphibians. In response to the many questions I have received on this topic, I have written down a few ideas for people to use as a guide in the treatment of newly acquired anurans. Note that these points could apply to almost any newly acquired animal.

1. Quarantine is probably the most important thing a hobbyist can do for his frogs.

ALL new frogs should be placed in quarantine for a period of 4-8 weeks, regardless of their appearance. At the very worst, a quarantine period will only keep healthy frogs from the general collection for this time. At the very best, you may save yourself and your frogs a great deal of unnecessary loss.

Quarantine should be best carried out in a separate room from the general collection. Quarantine facilities should consist of a relatively simple set-up. A 10 gallon aquarium with a small plastic "Honeymoon Hut" and dead sphagnum moss or artificial floor covering. The aquarium and all of its contents should be sterilized before and after each use, preferably with a solution of 10% Bleach in water. Let the tank and its contents air dry in the sun before storing or using. All utensils used for the quarantine tank must not be used for any other tank. This means buying a separate spray bottle at the very least.

Also, work with the quarantine tank AFTER you have worked with all other frogs. This way, you will prevent the spread of potential disease from your hands. It should go without saying that you should ALWAYS WASH YOUR HANDS BETWEEN TANKS.

2. New frogs are stressed (often severely) and are often diseased.

Some degree of medical treatment is indicated for newly acquired frogs, be they wild caught imports or captive bred animals from a friend down the street. In addition to potential parasite, bacterial, and protozoal infections, many frogs are also dehydrated and/or malnourished. Medical treatment always includes quarantine, and potentially rehydration, deworming, antibiotic therapy, close observation, exam by a veterinarian, and TLC.

I would suggest that after being shipped all frogs are at least dehydrated. The basic treatment for rehydration includes soaking a frog in an electrolyte solution, like unflavored Pedialyte®, or simply soaking it in dechlorinated tap water. In most cases this should suffice. In addition, a period of quiet, warmth, and dark may also help a frog recover from a rough shipping period.

3. Parasites can be extremely devastating to a stressed frog.

The basic treatment for parasite infections include antiparasitics like fenbendazole (Panacur®) or Ivermectin (Ivomec®) or levamisole or pyrantel pamoate. I use 50-100 mg/kg fenbendazole orally or 50-100 ug/kg ivermectin orally or transdermally. These treatments are done for 1-3 days and repeated 1-3 weeks later. Ivermectin can produce neurologic side-effects, and should be discontinued if these are seen. Fecal exams can be done at home, and typically require a 10-50 power microscope. Direct smear and fecal flotation should be performed. Fecal floats are done as follows: mix feces and Zinc Sulfate in a small container (test tubes are good), fill to brim with Zinc Sulfate, rest a slide or coverslip on top and let sit for at least 10 minutes. Read under microscope. Direct smears are done with normal (0.9%) saline. It is important to note that interpretation of this test is what counts, and this should be done by a veterinarian until you know exactly what to look for.

4. Protozoal infections are typically NOT infections.

Many protozoans have been shown to be present in normal frog GI tracts, and this suggests they are commensal organisms, if not beneficial to the frogs. Treatment should be avoided unless populations of protozoa are extremely large, or all other causes for a frog's illness have been ruled out. Metronidazole at 50 mg/kg once per day orally for 1-3 days and repeated in 1-3 weeks is appropriate, although many people will give metronidazole as a one time dose of 50 mg/kg. Metronidazole can have severe neurologic side effects, so used it carefully and discontinued if neurologic signs are seen.

5. Bacterial infections can be particularly devastating to frogs, as they are very susceptible to septicemia (bacteria living and reproducing in blood), and can quickly succumb and die from even minor infections.

Infections typically occur via wounds, and may present as dark or red blotches, ulcers, or general depression and ADR (Ain't Doin' Right). Normally gram negative pathogens are involved, and treatment with appropriate antibiotics of the correct dosage is indicated. Enrofloxacin (Baytril®) is my personal favorite, but it is alcohol based and not suitable for transdermal or topical application. Better drugs for topical application are ophthalmic preparations which are meant to be applied to sensitive areas and are properly formulated.

6. Fungal infections can and do occur, particularly on the eyes and skin.

These may be primary or secondary, and can be diagnosed by microscopically examining skin scrapings for fungal elements. Appropriate therapy with topical or systemic antifungal medications is indicated.

7. Severely emaciated frogs may have to be force fed before they will recover enough to eat on their own.

The technique varies with the size of the frog, but in general a good force-fed diet includes all of the necessary nutrients, often in a concentrated form to decrease the volume of food to be force-fed. Several commercial force-fed diets are available. A simple diet can be made by making a paste of fruit-flies, crickets (without the legs or wings), vitamin/mineral powder (VERY LITTLE), and a few drops of water. A mortar and pestle can be used to grind these ingredients together, and a small syringe and catheter can be used to feed the mixture. Most frogs (thankfully) will eat on their own providing other problems and diseases are taken care of.

8. Get a veterinarian.

Pick a veterinarian who is willing to listen and work with you. Most vets don't know much about frogs, but they know a lot about the art and science of medicine. Give them a chance, and they will provide you with plenty of knowledge and help. You will pay for their services, but most vets have gone to school for 8 years and are \$40,000 to \$80,000 in debt from student loans. You pay a veterinarian for his/her knowledge, and not just the drugs they give you.

A frog owner should not simply go to the pet store and buy some fish medication and treat his frogs. Granted, some will have some luck with this method. But the greater majority of the time this technique will be ineffective at best, and harmful (potentially fatal) at worst. A frog owner should work in conjunction with his/her veterinarian, even if this means visiting the vet only one time to explain your problems and situation.

9. If anyone has a sick frog and they want to send me a picture of it or present it for further work up, I would love to hear from you.

Hobbyists are invaluable in expanding the base of knowledge we veterinarians have concerning amphibian medicine. Not much is known specifically about amphibian disease. Particularly now, in this time of drastic declines in world amphibian populations, knowledge of amphibian disease is very important. The salvation of species may depend on what we know. You, as collectors and hobbyists, have a much greater daily exposure to these animals, and you can help the veterinary community by telling us what you have found.

SPECIES INFORMATION

Gerd Voss of the IGF has put together a questionnaire on various aspects of keeping and breeding poison frogs. The results of one of these questionnaires is presented here.

If you keep and breed any poison frog please take the time to fill out the questions presented here for the frogs you keep. In this way we can produce captive care and breeding guidelines for all the various species in our care. Send your information to either the Newsletter Editor (Charles Powell, 2932 Sunburst Dr., San Jose, CA 95111-2264) or Gerd Voss (Am Heerweg 19, D-30900 Bissendorf, Germany). Thanks.

***Epipedobates trivittatus* by Matthias Kneller (7/96)**

Physical description

Average size of female: 70 mm.

Average size of male: 58 mm.

How to identify males from females: Males are a little smaller and have vocal pouches.

Typical color morph: Black body with two dorsolateral stripes of yellow or green. Legs are green to yellow.

Other color morphs: Some forms have a central dorsal stripe similar to the dorsolateral stripes.

Maximum size of tadpoles: 38 mm.

Call: Retarded trill; very loud.

Biotype and distribution

Distribution: Peru and northern South America.

Biotype: Very wet rain forest from sea level to about 700 m.

Population density: 80 m between calling males

Relative humidity during dry season: About 80%.

Temperature range: 5°; recommended temperatures are 25°C during the day and 20°C at night.

Rainy season: Depends on locality.

Are the frogs sitting in sunlight: No, only found in shadow.

When is their active time: Between 6 AM and 6 PM.

What kinds of food do they like: No special information.

Vivarium

Recommended dimension: 150 x 65 x 65 cm.

Terrarium landscaping: These frogs live at the bottom of the tank; heavily planted with large plants.

How often do you simulate rain: One to two times a day.

Average age in terrarium: Eight years.

Maximum age in terrarium:

Behavior - outgoing or reclusive: Not shy.

Breeding

Eggs/clutch: About 50.

Where are they placed: Under a half coconut

Sensitive to light: no

Development time for eggs: Two weeks.

Development time for tadpoles: Five weeks.
Food for tadpoles: Fish flake food or living food
Tadpoles kept singly or in groups: Together, not aggressive.
Are F1 different from wild caught parents: No.

ANNOUNCEMENTS

American Frog Day.—The Third American Frog Day has been scheduled for September 6th from 9 AM to 4 PM. It will be held again this year at First Assembly of God Church, 801 Hellyer Ave., San Jose, California 95111. If you are interested in giving a talk, selling frogs, plants, etc. or just want information, contact Charles Powell (2932 Sunburst Dr., San Jose, CA 95111-2264. Tel.: (408) 363-0926; Fax: (408) 972-2182; E-mail: powell2@Ave.net).

The following letters (e-mails) are reprinted here to make everyone aware of what's going on in the animal trade in America. These letters were found on the internet discussion group and printed in *Invertebrata*, 1(3): 1-6. They have been heavily edited here (***) to conserve room, but you'll get the idea. For further information refer to the *Invertebrata* article.

From: Steven W. Bullington
Subject: Anti-Exotic Legislative Alert

Remember my postings a few months ago about the USDA wanting to regulate millipedes, mantids, and the like? In the discussions I had with USDA personnel they hinted at an upcoming initiative to control all exotics. This initiative has started today. ***

I read the letter to Gore carefully and it sounds innocent enough. But I am sure that both the USDA and the USFWS will use any resulting legislation to clamp down with an iron fist on the importation and keeping of ALL exotics, including reptiles and amphibians as well as tarantulas and scorpions, not to mention millipedes and such. The person I talked to at the USDA said as much. Therefore EVERY exotic pet owner in this country needs to either write or sign some kind of letter, either to Gore, or even better yet to some Senator or Republican presidential candidate who can assure that the resulting legislation will leave herps and terrestrial arthropods untouched. I'm not sure exactly who this would be, but I intent to find out. *** If enough of us write they will have to take our needs into consideration.

To: The Honorable Albert Gore, Jr.
From: James T. Carlton, Daniel Simberloff, Phyllis N. Windle, E. O. Wilson, Kenneth G. Beck, II, Howard Singletary, Gary K. Meffe, Ronald Carroll, Harold Mooney, and Peter Vitousek
Subject: Anti-Exotic Legislation

We write as a group of scientists, agricultural officials, and environmental experts to request your assistance in, and support for, the formation of a commission whose purpose would be to recommend new strategies to prevent and to manage invasions by harmful exotic species. A rapidly spreading invasion of exotic plants and animals not only is destroying our nations biological diversity but is costing the U. S. economy hundreds of millions of dollars annually. Biological invasions produce severe, often irreversible impacts on agriculture, recreation, and our natural resources. In some instances, they even have major human health consequences. The 21st century holds the clear

threat of further devastating invasions unless a coordinated national effort is established. In March 1993, twenty-five distinguished scientists and resource managers wrote to you identifying the need for an effective national program to combat invasions by nonindigenous plants and animals. You kindly replied that these issues indeed concern your office, and we were pleased to note that these problems had received your attention. Since 1993, biological invasions by pest and nuisance species from foreign nations, and from one part of the United States to another, have continued almost unabated. Recent studies reveal, for example, that San Francisco Bay is invaded by a new exotic species on the average of once every twelve weeks. At least 1.5 million acres in Florida have been invaded by nonindigenous plants, leading to a severe deduction in available natural habitat. Foreign weeds are spreading on Bureau of Land Management land at over 2,300 acres per day and on all western public lands at approximately 4,600 acres per day. Approximately 250 plant species meeting the Federal Noxious Weed Act's definition of a noxious weed remains unlisted and can still be legally imported into the U. S. In the Mississippi drainage basin, species richness is expected to decline by 50% within a decade because of zebra mussel spread. Exotic species invasion have contributed to the decline of 42% of U. S. Endangered and threatened species. Although the National Invasive Species Act of 1996 was an important step forward, the overall national effort to confront this crisis remains inadequate; it is primarily piecemeal, ad hoc, and reactive. For example, more than 20 federal agencies deal with invasive exotic species, but their policies and actions are uncoordinated and largely ineffective. There is not even a comprehensive data base on the problem. Innumerable state agencies and private organizations also operate in this arena, often entirely unaware of one another's problems and actions. Actions of various managers even inadvertently conflict with one another. Simply coordinating this effort would not only enhance its effectiveness but save millions of federal, state, and private dollars. *** What is most urgent is to begin a high-level consideration of possible responses, as the situation is deteriorating every day. We are losing the war against invasive exotic species, and their economic impacts are soaring. We simply cannot allow this unacceptable degradation of our nations' public and agriculture lands to continue. The cogent 1993 report of the Congressional Office of Technology Assessment, Harmful Non-Indigenous Species in the United States, on the extraordinary economic and health costs to this nation of exotic invasions, provides an excellent introduction to these issues. ***

NEW LITERATURE

DENDROBATIDS

Armitstead, Paul, 1997, Costa Rica-April 1994. British Dendrobatid Group Newsletter, 29: 1-4.

Blake, Edwin and Sherriff, Douglas, 1997, Maintenance of the blue poison arrow frog (*Dendrobates azureus*) at Edinburgh Zoo. British Dendrobatid Group Newsletter, 29: 6-10.

Cummins, Clive, 1997 Trade in Dendrobatid frogs. British Dendrobatid Group Newsletter, 29: 11-12.

Ray, C Claiborne, 1997, Frog's unusual diet for a longer life: a medley of toxins. The New York Times, Science Section: B11 (June 10, 1997).

ADS:

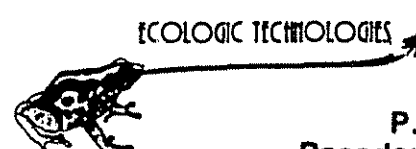
Rates for business card adds are \$10 per issue or \$50 per year. If you are interested please contact the Newsletter editor.

REPTILE SPECIALITIES (John Uhern, 7473 Foothill, Tujunga, CA 91042 Tel. (818) 352-1796; Fax (818) 353-7381) has various captive breed Dendrobatids and wild imported *Mantella* for sale. Write or call for information.



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For Sale

Ads for sale of frogs, or requests or offering of breeding loans, etc. are free to members and will run for two issues only, unless the Newsletter editor is notified.

<i>Dendrobates tinctorius</i> 'large yellow form' (c.b.)	\$150 ea.	The Boa Barn
<i>Dendrobates tinctorius</i> 'white' (c.b.)	\$75 ea.	P. O. Box 123
<i>Dendrobates tinctorius</i> 'yellow back' (w.c.)	\$150 ea.	Long Green, MD 21092
		(410) 592-9674

Two pair of adult wild caught *Dendrobates tinctorius* 'powder blue' for sale at \$250/pair. I have had these frogs for about 6-8 months, they are very healthy and I will consider any reasonable trade or offers. Odo Nicholas Dietel and Shelly Ann Dietel (102 North Berger Parkway #L1, Fon Du Lac, WI 54935 Tel: (414) 921-1223, e mail: dartboy@internetwis.com).

Male *Dendrobates pumilio* and *Phyllobates bicolor* tadpoles to trade for female *D. pumilio*, male *D. lehmanni*, and/or female *D. histrionicus* 'Bullseye' (would consider offering 0.0.1 cb *D. histrionicus* in trade). Ron Gagliardo, 1180 Oldfield Rd., Decatur, GA 30030 Tel.: (404) 876-5859 x 255 (Atlanta Botanical Gardens), e-mail: kikker@earthlink.net.

<i>Dendrobates leucomelas</i>	\$30 ea.	Jenny Hackforth-Jones 1241 Sweet Briar Rd. Madison, WI 53705 (608) 233-3002
<i>Dendrobates azureus</i> (tadpoles)	\$75 ea.	Anthony Hundt P. O. Box 284 Ottawa, IL 61350 (815) 433-4679 thundt@bb-elec.com

Dendrobates tinctorius 'cobalt,' 'giant orange,' and 'white,' and some *Dendrobates azureus*. Market prices. Ted R. Kahn (P. O. Box 1375, Sterling, VA 20164-1375. Tel.: (703) 242-4543.

<i>Dendrobates tinctorius</i> 'cobalt'	\$55 ea.	John Lewis
<i>Epipedobates tricolor</i> 'Moraspunga, chocolate with lime green'		717 Bromley Rd.
F1 offspring	\$35 ea.	Bromley, KY 41017
Red-eye tree frogs - F1 offspring	\$25 ea.	(606) 344-8796
		jjlewis@fuse.net
<i>Dendrobates auratus</i> 'Costa Rica'	\$25 ea.	Jeff McClure
<i>Dendrobates leucomelas</i> 'orange' & 'yellow' tadpoles	\$40 to \$50 ea.	1331 Longfellow Dr.
<i>Dendrobates auratus</i> 'Costa Rica'	\$20 ea.	Clarksville, IN 47129-2023
<i>Dendrobates leucomelas</i>	\$20 ea (bye 2, get one free)	(812) 944-5859
<i>Dendrobates azureus</i>	\$120 ea.	Jane Merkel
<i>Dendrobates leucomelas</i>	\$40 ea.	3407 Manhattan Ave.
<i>Dendrobates reticulatus</i>	\$35 ea.	St. Louis, MO 63143
<i>Dendrobates tinctorius</i> 'cobalt'	\$60 ea.	(314) 644-3705
<i>Epipedobates tricolor</i> 'maroon/blue'	\$25 ea.	
<i>Dendrobates azureus</i>	\$125 ea.	Ryan Michaels
		616 Mia Ct.
		Danville, CA 94526
		(510) 743-0777
<i>Mantella aurantiaca</i> c.b.	\$20 ea.	Jennie Munger
		75 Sunrise
		Hollister, CA 95023
		(408) 637-0481
<i>Dendrobates tinctorius</i> 'pallid'	\$50 ea.	Patrick Nabors
<i>Dendrobates tinctorius</i> 'powder blue'	\$65 ea.	(309) 622-2609
<i>Dendrobates tinctorius</i> 'yellow back'	\$55 ea.	
<i>Dendrobates auratus</i> 'Costa Rica'	\$25 ea.	Eric Pflaging
<i>Dendrobates leucomelas</i>	\$60 ea.	Hillside Herps
10% discount for ADG members		220 Hillside Dr.
		Clermont, FL 34711
		(352) 242-1616
<i>Dendrobates auratus</i> 'Panamanian, 70% black'	\$40 ea.	Charles L. Powell, II
<i>Dendrobates leucomelas</i>	\$30 ea.	2932 Sunburst Dr.
<i>Dendrobates ventrimaculatus</i> 'Peru, orange' Tadpoles	\$50 ea.	San Jose, CA 95111-2264
<i>Dendrobates auratus</i> 'Panamanian, 70% black'	\$30 ea.	(408) 363-0926
<i>Dendrobates azureus</i>	\$75 ea.	powell2@Ave.net
<i>Dendrobates ventrimaculatus</i> 'Peru, orange'	\$40 ea.	

<i>Dendrobates azureus</i> - tadpoles	\$80 ea.	Mark Pulawski
froglets	\$100 ea.	4191 Weathered Oaks Ln.
<i>Dendrobates tinctorius</i> 'giant yellow' (new morph)		Indian Springs, OH 45011
tadpoles	\$80 ea.	(513) 896-5531
froglets	\$100 ea.	
<i>Phyllomedusa tomopterna</i>	\$75 ea.	Rick Russell
		19741 Woodbridge Ln.
		North Fort Myers, FL 33917
		Phone & Fax (941) 731-6592
<i>Dendrobates tinctorius</i> 'cobalt'	\$50 ea.	David Ryan
	3 for \$135	3350 21st. Ave., S. W.
<i>Dendrobates tinctorius</i> 'powder blue'	\$75 ea.	Naples, FL 33964
	3 for \$200	DRyan51724aol.com
<i>Dendrobates azureus</i> 'F1 from wild parents'	\$150 ea.	Jack Wattley
Tadpoles		2500 Sea Island Dr.
<i>Dendrobates azureus</i> 'F1 from wild parents'	\$100 ea.	Fort Lauderdale, FL 33301
<i>Dendrobates truncatus</i> 'F1 from wild parents'	\$75 ea.	(305) 463-5011
		Fax (305) 463-4716

AMERICAN FEDERATION OF HERPETOCULTURISTS. A non-profit national membership organization of herpetoculturists, veterinarians, academicians, and zoo personnel involved in the captive husbandry and propagation of amphibians and reptiles. Membership includes the highly acclaimed Vivarium magazine, dedicated to the dissemination of information on herpetocultural accomplishments, herpetological medicine, breeding and maintenance, field studies and adventures, enclosure design and much more. Membership in the AFH is \$28.00 U.S. and \$53.00 Canadian and all other foreign countries. Contact: AFH, P. O. Box 300067, Escondido, CA 92030-0067. Tel.: (619) 747-4948; Fax (619) 747-5224.

AMERICAN TARANTULA SOCIETY: For enthusiasts and scientists. Forum magazine (6/yr) educational, entertaining and readable. Over 150 Accurate scientific & common names of tarantulas and scorpions in each issue. Contact: ATS, P. O. Box 2594, S. Padre Island, TX 78597. \$15/year US, \$20 Canada, \$30 elsewhere.

INTERNATIONAL HYLID SOCIETY: A non-profit organization dedicated to treefrogs enthusiasts worldwide. "The Bulletin of the International Hylid Society" will be published quarterly.

Membership is \$15/calendar year. For information or membership contact: William Brown, Amphibian Conservation and Research Center, 2607 Thomas Road, Valparaiso, IN 46383 USA. Tel: (219) 464-1922; e-mail: 102436.2415@compuserve.com.

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